

throughout the records and monthly totals were accepted for monthly rainfall records with less than five missing days. The monthly totals for the period of record, 1995 and 1996 are given in Table 1 for these stations. Table 2 expands the summary data from Table 1 to provide data on dry and wet season averages and the annual total for Period of Record (POR) and Test 7 years.

ANTECEDENT RAINFALL SUMMARY

The monthly rainfall totals for the wet season preceding Test 7 were consistently higher than the period of record averages. Table 3 defines a system developed by the meteorology staff at the SFWMD for classifying rainfall totals qualitatively for intervals ranging from one month to a year. The characterization is made relative to a period-of-record (POR) of 30 or more years. The antecedent dry and wet seasons for Test 7 were both classified as 'very wet' for the area represented by the stations listed in Table 4.

TEST 7 RAINFALL SUMMARY

Year One of Test 7 from November 1995 through April 1996, recorded below average rainfall in the Test 7 area. November 1995 started Test 7 as the driest month overall in two years and December 1995 followed as the driest month overall in three years. May, the transition into the wet season, brought some locally heavy rains over the L-31W area and a resulting rise in the marsh water levels. No significant rainfall affects were felt from May through September 1996, though there were some localized events in the C-111 basin and over WCA-3 (see discussion of C-111 and Shark River Slough). Tropical Storm activity of note included *Bertha* (July), *Hortense* and *Fran* (September), and *Josephine* and *Lili* (October). Rainfall associated with Tropical Storm *Josephine* over the C-111 basin followed by Hurricane *Lili* accounted for most of the October rainfall. The Test 7 dry season, averaged over the stations in Table 1, was classified as "dry." The Test 7 wet season, averaged over the stations in Table 1, was classified as "normal."

Year Two of Test 7 from November 1, 1996 through October 31, 1997, was below average for the dry season but the wet season was classified as "very wet." April and May were the wettest months in the dry season, with April being a little above average for the month. The wet season ended at above average primarily as a result of excessive rains in June and then above average rains in August. Basin rainfall ranged from 5.86 inches over the Western Everglades Agricultural Areas to 16.64 inches over Dade County in June. The August total for Dade County was 11.3 inches. July and September were about average, but October was well below the monthly average. The year as a whole was above average.

Year Three of Test 7 from November 1, 1997 through October 31, 1998, was above average for the hydrologic year, with the dry season being above average (154 percent) and the wet season being below average (88 percent). The wettest months in the dry season were December, February, and March. November and January were average and May was well below average. June and September were well above average in the wet season. In each of the two months the total experienced was more than 200 percent of the average for each month. At about 56 percent of the average rainfall October was very dry.

**Table 1. Total Monthly Rainfall at Test 7 Area Stations
During 1995 and 1996**

Month	Royal Palm POR	1995	1996	S-336 POR	1995	1996	Home FS POR	1995	1996	Tamiami @ 40 mi Bend POR*	1995	1996	S-18C POR**	1995	1996
January	1.72	2.65	1.98	1.60	3.41	1.72	2.28	2.43	1.65	1.67	3.36	0.95	1.41	1.13	0.66
February	1.82	-M-	-M-	1.42	1.70	0.15	2.29	0.45	2.13	1.65	0.59	0.67	1.51	0.03	0.04
March	1.82	-M-	1.6	2.58	1.78	1.37	2.25	1.82	1.65	2.01	1.57	2.72	1.45	1.48	1.24
April	2.78	2.68	2.90	2.15	1.41	2.97	2.80	2.38	2.49	2.34	1.85	2.38	2.30	3.38	1.45
May	6.17	6.26	7.89	4.32	3.68	8.93	6.49	6.36	5.15	5.54	6.89	9.11	5.17	4.40	2.59
June	9.25	15.21	-M-	8.06	19.24	6.91	10.32	12.80	9.72	9.77	17.39	8.48	7.94	12.60	7.98
July	7.01	6.52	3.29	5.29	5.61	2.81	7.45	12.17	3.33	7.62	7.53	3.05	4.48	3.74	0.82
August	7.84	11.83	7.96	7.59	14.35	7.22	8.09	9.84	5.49	7.22	8.55	7.12	6.87	10.64	5.75
September	8.28	4.96	6.16	7.44	9.71	4.08	9.13	10.96	10.03	7.62	8.53	6.54	6.27	9.41	4.07
October	5.77	-M-	9.39	4.01	10.85	10.39	5.51	11.56	5.14	4.90	12.03	7.62	4.46	10.90	10.92
November	2.55	0.96		2.97	1.92		2.81	0.71		1.80	0.16	1.94	0.36		
December	1.35	1.00		1.24	0.81		1.79	1.63		1.30	0.91	1.24	0.58		
Dry	18.17	-M-	-M-	16.28	24.23	17.87	20.43	25.32	15.41	16.4	26.75	16.9	15.22	19.96	6.92
Wet	37.96	-M-	-M-	31.43	59.76	31.41	40.3	57.33	33.71	36.83	54.03	32.8	30.17	47.29	29.54
Year	56.46	-M-	-M-	47.7	83.99	49.28	60.47	82.65	49.12	52.97	80.78	49.7	45.08	67.25	36.46

NOTE: Dry season is from November through May.

Wet season is from June through October.

The Year represents the sum of the wet and dry season.

*Tamiami Ranger Station @ 40 mile Bend POR 1/49-10/96 missing data 1993-1994 (ENP).

**S-18C POR 4/67-10/96 (SFWMD).

Source: *Test Iteration 7, Year One, Hydrologic Monitoring Report*, draft, August 29, 1997.

**Table 2. Annual, Dry Season, and Wet Season Total Rainfall
Test 7 Years One, Two, Three, and Four**

Test 7 Year	Annual (Inches)	Dry Season (Inches)	Wet Season (Inches)
Year One	49.1	15.4	33.7
Year Two	67.1	17.7	49.4
Year Three	60.5	26.6	33.9
Year Four	58.8	16.6	42.2
POR	52.5	17.3	35.3

NOTE: Year One totals derived from Table 1.

Years Two, Three and Four derived from monthly *Surface Water Conditions Detail Report*, SFWMD. The monthly totals used were Dade County.

**Table 3. Rainfall Classification System Developed by the
SFWMD Meteorology Staff**

	Classification of Rainfall Categories (as represented by percentage of mean)						
	Extremely Dry	Very Dry	Dry	Normal	Wet	Very Wet	Extremely Wet
1 month	<10%	10-40%	40-75%	75-125%	125-200%	200-300%	>300%
5 months	<30%	30-60%	60-85%	85-115%	115-150%	150-180%	>180%
6 months	<35%	35-65%	65-85%	85-115%	115-140%	140-170%	>170%
7 months	<40%	40-70%	70-90%	90-110%	110-130%	130-160%	>160%
Annual	<50%	50-75%	75-90%	90-110%	110-125%	125-150%	>150%

Table 4. Test 7 Structure Operating Criteria

Area	Structure		Test 7 Operations
SRS	S-12A-D		Operate as per the rain/stage formula Goal is to deliver 45% of total
	S-333		Open to deliver 55% of model target if: L-29 TW < 7.5 S-176 HW < 5.0 G-3273 <= 6.8
L-31N	G-211	OPEN CLOSE CLOSE	HW > 6.0' HW = 5.5 When S-331 pumping max. Note: If the reach between G-211 & S-331 > the reach between G-211 and the Tamiami Trail, and S-331 is unable to pump due to TW constraints then G-211 & S-338 may be opened. * Can be opened to meet water supply needs.
	S-338	OPEN CLOSE	HW @ G-211 > 5.8 HW @ G-211 <= 5.5
	S-331	ON OFF	Open as long as: S-331 TW < 6.0 and S-176 HW < 5.5 (if 176 > 5.5 wait until 176 < 5.0') no limits if Angels well < 5.5 if 5.5 < Angels < 6.0 then 4.5 < S-331 HW < 5.0 If Angels well > 6.0 then 4.0 < S-331 HW < 4.5 til angels <= 5.7' Closes when above not meet.
	S-176	OPEN CLOSE OPEN CLOSE	Non-flood conditions S-176 HW = 5.0 S-176 HW = 4.75 Can be opened to meet water supply needs. Flood conditions S-176 HW = 5.0 S-176 HW = 4.6
	Target stage is between 3.0 & 4.7 measured @ S-175 HW		
L-31W	S-174	OPEN CLOSE CLOSE	HW >= 4.85 or to maintain Target stage HW = 4.65 If TW > HW
	S-332		Operate as needed to maintain the target state. Do not exceed 165 cfs January-June due to Cape Sable Sparrows
	S-175	OPEN CLOSE	HW > 4.7 HW = 4.3
C-111	S-177	OPEN CLOSE	HW > 4.2 HW = 3.6
	S-18C	Monthly minimum delivery schedule remains in effect. OPEN CLOSE	HW > 2.6 HW = 2.3
	S-197	OPEN CLOSE	S-177 > 4.1 (S-177 gates are open) Or S-18C HW > 2.8 (open 3 culverts) S-177 HW > 4.2 = 24 hr. or Or S-18C HW > 3.1 (open 7 culverts) S-177 HW > 4.3 or OR S-18C HW > 3.3 (open 13 culverts) S-176 HW < 5.3 & S-177 HW < 4.2
	S-178	OPEN CLOSE	5.0 4.5

Year Four of Test 7 (November 1, 1998 – October 31, 1999) began wet. November experienced 200 percent of its average rainfall most of which came on the fourth of the month. December was slightly below average and January was slightly above average. February, March, April, and May were well below average. The dry season for the hydrologic year was about average. June, which is typically the wettest month of the calendar year, was wet. It was the tenth wettest June going back to 1932. A meteorological summary for July was not available. August was also very wet and would have been wetter if not for a near miss by Hurricane *Dennis* and subsequent drying in late August. The second half of September experienced wet conditions primarily from Tropical Storm *Harvey*, but the month ended with totals just about average. The wet season was greater than average with heavy rainfall in October finishing out the hydrologic year. October was the second wettest October in 30 years. Hurricane *Irene* produced half of the total for the month between predawn on October 14 and the morning of October 16. The wet season was “wet,” as it was the second wettest wet season since 1960.

OPERATION SUMMARY AND ANALYSIS

This section contains a summary and brief analysis of the operations during Year One of Test 7 for the Shark River Slough, L-31N, L-31W, and C-111 areas. Structure water levels and operational criteria for the four years of Test 7 were defined in Appendix C of the Test 7 EA and are summarized in Table 4.

Shark River Slough

SHARK RIVER SLOUGH (SRS)

SRS Operational Objectives Test 7

Water deliveries to the Shark Slough watershed during the Test 7 iteration continued to be based on the quantities prescribed by the Rainfall Plan. Under this plan, the Water delivered to the slough consists of two components, a rainfall quantity based on the average rainfall which occurred over WCA 3A and a supplemental component based on the average stage attained in WCA 3A and the relation of this water level to the revised operational schedules established for the area. Discharges from WCA 3A to Northeast Shark Slough are to be made in order to attain a distribution of water to the Shark Slough consisting of approximately 55 percent into Northeast Shark Slough, via S-333, and 45 percent to West Shark Slough, via the four S-12 structures. Flows through the four S-12 structures would be calculated to obtain a distribution corresponding to a 10 percent, 20 percent, 30 percent, and 40 percent of the total West Shark Slough component through S-12 A, B, C, and D, respectively.

SRS Operational Criteria

The operational criteria for Test 7 are outlined in Table 4 (page 9). Figure 2 (page 20) shows the opening and closing criteria for S-333.

Difference in Previous Tests and Test 7 Criteria

The total annual period of record discharges to Shark Slough from WCA-3A are shown in Figure 3 (page 21). The total quantity of water discharged into the Shark Slough of Everglades National Park during the hydrologic year 1996, or Year One of the Test 7 period, was 1,329,252 acre-ft. During the Rainfall Plan period (1985-1996), water deliveries to the Shark Slough from WCA3A have averaged 824,733 acre-ft per annum. The quantities delivered during Year One of Test 7 correspond to the fifth highest discharge for the available period of record (1940-1996) and the third largest deliveries under the Rainfall Plan.

SRS Summary of Operations

Wet Season 1995. WCA-3A was above schedule from June 1995 through January 1996. The gates at S-12A through S-12D, were open full June 28, 1995 and remained open full until January 24, 1996. The S-343A and S-343 B in L-28 were open through January 1996. Culverts structures S-346, S-347 were closed on the 24 January 1996.

In November 1994, under emergency authority, the SFWMD removed a section of the Old Tamiami Trail and cut a gap between S-12D and the L-67 Ext canal. The Corps of Engineers placed two earthen plugs in the Old Tamiami Canal (the Old Tamiami Canal is between the Tamiami Trail, US 41, and the Miccosukee Village) to relieve flooding problems on Miccosukee Tribal lands. One plug was placed where S-12A outflow intersected the old canal and the other where S-12B outflow intersected the old canal. Both the gap at S-12D and the earthen plugs remain.

Year One Test 7. The rainfall stage model, which is computed on a weekly basis, indicated maximum discharges through the S-12 structures and S-333 through December 1995.

WCA-3A stage was above the upper transitional zone and the S-12s were all open full with maximum discharge through the end of 1995 (see Figure 2). S-333 remained closed due to the operational constraints of the S-333 tailwater in L-29 and water levels in the East Everglades as measured at G-3273. The culverts along the L-67 Ext were open. WCA-3A stage entered the upper transitional zone and for the week ending on January 19, 1996 and the rainfall stage model indicated a total discharge of 1,877 cfs. On January 29, discharges began at S-333 (see Figure 2). S-339 and S-340 in WCA-3A were closed. S-343A and B were open through January. S-334 was closed. The culverts along the L-67 Ext were closed. By February 24, the S-12 discharge were 45 percent of the model total and S-333 discharges were 55 percent of the total. S-12A was fully closed on February 23. WCA-3A remained below schedule.

On March 4 during an interagency meeting where SFWMD, U.S. Fish and Wildlife Service (USFWS), USACE, BCNP were represented, discussions on reducing flow into Western Shark River Slough to lessen impacts on nesting Cape Sable Seaside Sparrows (CSSS) were made. After coordinating with representatives of ENP, a decision was made to close S-12B, S-334 A and B, and S-344. After further discussion during an interagency phone conference on March 12, a decision was made to close the S-12C and D. The general consensus of the meeting was that the water levels in NWSRS were receding and would continue to recede barring any large rainfall event. Closing the S-12 structures and passing the total model discharge through S-333 was chosen as an option that would not cause adverse impacts and could possibly speed up the recession of water in NWSRS. Total model discharges were made through S-333 for the remainder of March and through the end of April. Gravity water supply releases from WCA-3A to the ENP-South Dade Conveyance System were made during April.

On May 11, 1996, a ValuJet airplane crashed into the area between L-67A and L-67C. S-151 was closed to facilitate crash investigations and S-333 and S-334 were utilized to make water supply releases to the ENP-South Dade Conveyance System. The Pilot Test was suspended. The transition into the wet season began in the third week of May. The contract for removal and backfilling of S-12F culverts was completed at this time. The backfill essentially acts as a plug in the Old Tamiami Canal and allows access to the FP&L powerlines.

The WCA-3A stage rose above the upper transition zone to Zone A (flood release zone) in June and gradually declined to the lower transition zone by September then rose back up to Zone A through October. The CSSS nesting season ended in June and discharges began through S-12D on June 12 and by June 26 all gates in S-12A through S-12D were open full and remained open through the end of Year One Test 7. S-333 was closed in June and October due to the trigger well criteria of 6.8 ft-NGVD, at G-3273. S-333 was reopened the last week in July and remained open through August. Culvert structures S-343A and B and S-344 were opened and discharges through S-151 June through September. S-339 and S-340 were open through July and closed in mid-August due to declining stages in WCA-3A.

The distribution of discharges between Northeast Shark Slough (L-30 to L-67 extension) and West Shark Slough (L-67 extension to Forty Mile Bend) are summarized in Figure 4 (page 22). As seen from this figure, West Shark Slough received the majority of all water (1,137,992 acre-ft) discharged to the basin from the four S-12 structures, accounting for approximately 90 percent of the total water released to the slough. Northeast Shark Slough only received 127,330 acre-ft of discharges from S-333 accounting for 10 percent of the total quantity of water released to

the slough. The small quantities of water delivered to Northeast Shark Slough were attributed to trigger well G-3173. For 23 weeks during 1996 no water was released through S-333 because the water level at G-3273 was above the trigger criteria of 6.8 ft-NGVD (see Figure 2). Under provisions of the Rainfall Plan and agreements between the ENP, the USACE, and the SFWMD, the balance of the water not capable of being released to Northeast Shark Slough is delivered into West Shark Slough. Therefore, the large quantities delivered during the high water periods in WCA3A to West Shark Slough were largely a result of the management provisions of the Rainfall Plan rather than being derived from natural climatological variability. These large discrepancies in the quantities of water delivered to West Shark Slough in comparison to Northeast Shark Slough are exhibited further in figures 5 and 6 (pages 23 and 24). These figures depict the actual quantities of water delivered to each of the Shark Slough flow sections in comparison to the targeted flows. The target flows for Northeast Shark Slough under the Rainfall Plan should account for 55 percent of the total flows to the slough while the quantities to West Shark Slough should account for the remaining 45 percent. During the Test 7 period, 568,597 acre-ft of water discharged into West Shark Slough should have been released into Northeast Shark Slough but was prohibited from being released into the area because of the trigger well criteria associated with the Rainfall Plan.

Year Two Test 7. Year Two began with WCA 3A above its upper transition zone schedule (see Figure 7, page 25). Because of below average rainfall in the dry season WCA 3A declined throughout the season. In June the area received high inflows and rainfall. The area rose to above its transition zone. High inflows and rainfall continued during the month of July and the level rose and stayed above its upper transition zone. The WCA 3A level continued above its upper transition zone through September. The area declined during October but ended the month in its upper transition zone. In the early part of the hydrologic year (November) releases were made from WCA 3A to WCA 3B because of declining stage levels in WCA 3B. The district, however, stopped releases on December 16 because of declining stages in WCA 3A. No releases were made from WCA 3A to WCA 3B in January but releases were started because of the need for water supply operation in February. Releases for water supply continued through May. In June the rainfall experienced caused the district to begin making regulatory releases from WCA 3A to WCA 3B. This was continued through September due to above average rainfall in the area. On October 9 the District started regulatory releases from WCA 3A into the tide. Releases from WCA 3A into WCA 3B were resumed on October 27 in accordance with its operational guidelines.

The Corps of Engineers made regulatory releases through S-12 structures at its maximum capacity all of November, except for S-12A, which was fully closed. From December through May and early June (prior to the June rainfall) releases were made through S-12 structures according to the rainfall plan. In June releases through S-12 were increased to its maximum capacity according to the rainfall plan. This operation was continued through the remainder of the hydrologic year (October 31, 1997).

In the month of November the district continued to make releases through the culverts along L-28 into the Big Cypress National Park, but stopped these releases on December 20. No releases from WCA 3A were made from that point in time through May and early June before the rains started. In June the district began to make regulatory releases from WCA 3A into WCA 3B and from WCA 3A through culverts along L-28 into Big Cypress National Park. The releases to Big Cypress National Park continued through the remainder of the hydrologic year.

Releases from WCA 3A into L-29 through the S-333 structure were begun on November 18 due to declining groundwater levels in the L-31N area. From December through May and early June releases from WCA 3A into L-29 through S-333 were made in accordance with the rainfall plan. With rainfall in early June groundwater levels in the area west of L-31 N increased and S-333 was closed. The structure was opened and then closed again in July and opened again for a few days in August. No further releases were made through S-333 in September to October (see Figure 8, page 26).

Water supply operations from WCA 3A into L-31N/C-111 were in affect during the first half of December and then February through May because of low canal stages. The water for supply came from WCA 3A releases through WCA B.

During the wet season several operations took place because of the excess rainfall experienced. For example, on July 17 the district stopped releases from WCA 3A into WCA 3B because of high stages in WCA 3B. In the second week of August, the district opened S-339 and S-340 in WCA 3A and resumed releases form WCA 3A into WCA 3B because of high stages in WCA 3A. The structures remained open through October 24 according to their operational guidelines.

WCA-3A stage was slightly above the regulatory level on November 1 and slowly fell through out the dry season. Structure S-333 was closed at the beginning of November due to the G-3273 constraint (water surface elevation greater than 6.8 ft) however the constraint was lifted just after the middle of November and S-333 discharged flow until the second week in June 1997 (approximately seven months) (see Figure 9, page 27). At this point in time there was rain which caused the stage elevation in WCA-3A to increase sharply for a half-foot or so and then slowly increase through October 1. During this period, from the second week in June through October 1, there was little flow through S-333 (about 20 days in July and about one week near mid-August). The gage at G-3273 was at 7.0 ft on 1 November but decreased rapidly to a low of 4.5 ft about middle April. From that point the level increased again to the 7.0 ft level the first week in June and remained above the 6.8 ft gage constraint (G-3273) for most of the wet season.

The *Test 7 Iteration, Year One Hydrologic Monitoring Report* (draft) dated August, 1997 rated the 1996 dry season as dry and the wet season as normal or about average. Using monthly stage averages as a means of comparison the 1997 dry season average stage was 0.5 ft lower than the dry season average for 1996 implying that the 1997 dry season was a little drier than the 1996 dry season. A similar comparison for the wet season shows the 1997 wet season being a little higher than the 1996 wet season (10.0 vs. 9.75). Since the stage comparisons between the seasons for 1996 and 1997 it is reasonable to apply the same rating to the two hydrologic years. The dry seasons were dry and the wet seasons were normal.

There appears to have been one rain event of any significance and that came in early June.

Discharge to Shark Slough from WCA-3A was fairly strong in the first six weeks of the hydrologic year and the decreased significantly until mid-June when the quantity increased significantly. The increase lasted until the first of September, and then reduced again but not to the low quantity experienced in the dry season. The target flow distribution of 45 percent to West Shark

Slough (S-12 A-D) and 55 percent to Northeast Shark Slough (S-333) was not met. The percentages were 87 percent West Shark Slough and 13 percent Northeast Shark Slough. This is a minor improvement over the percentages in the previous hydrologic year, which was 90 percent and 10 percent, respectively. The total volume of discharge was 781,500 acre-ft, which compared with a total of 1,244,450 acre-ft for the previous hydrologic year. The distribution between West and Northeast was 677,600 and 103,900 acre-ft, respectively. See figures 10, 11, and 12 (pages 28, 29, 30). These figures show the distribution of flows to Shark Slough and to the west and northeast.

Year Three Test 7. The dry season of Test 7 Year Three started with regulatory releases from WCA 3A into tide but this operation was terminated on November 7. WCA 3A declined to below its schedule by the end of the month (see Figure 13, page 31). The level of WCA 3A rose in December to above its upper transition zone and was within the upper zone through January. In January the Corps of Engineers opened a gap in L-67A and L-67C to release water from WCA 3A to WCA 3B. Releases were reduced on January 16 and then terminated on January 20 because of high stage in WCA 3B. The Corps of Engineers operated WCA 3A under a temporary deviation schedule to save the Cape Sable Seaside Sparrow. WCA 3A was within its Zone 2A during February. Discharge through S-12 was limited to 100 cfs. The district began to release water from WCA 3B into L-30 on February 23 from WCA 3A into WCA 3B on February to use the South Dade Conveyance system as the outlet for WCAs 3A and 3B. The month of March operated the same as the month of February. April also operated the same as February and March except discharge through S-12 was reduced. In May WCA 3A declined below its normal schedule. Most operations changed from emergency to normal plan during the month. The district continued to release water from WCAs 3A and 3B during the first part of the month.

Limitations for tailwater at S-333 were kept at 8 ft to increase discharge through S-333. On June 24 releases through S-12 and S-333 were terminated. Corps of Engineers kept the gap in L-67A and L-67C open all month to releases water from WCA 3A into WCA 3B. In July WCA 3A rose from below to above its lower transition schedule for the month. Discharges through S-12 and S-333 resumed on July 29 according to the rainfall plan (see Figure 14, page 32). Operations in August were the same as July. During October WCA 3A declined in the last week of the month. WCA 3A ended the hydrologic year near its schedule. The Corps of Engineers kept the gap in L-67A and L-67C open for most of the wet season. Releases through S-333 resumed on July 26 after groundwater level in the area declined.

Releases in Big Cypress National Reserve through culverts along L-28 were terminated on November 14. No further releases were made until September when releases were resumed and continued the rest of the hydrologic year (through October).

The WCA-3A stage at the beginning of Year Three was about 10.0 ft. The stage rose to about 10.5 ft in December and remained about that level until the end of March when the level began to recede reaching a level of about 7.9 ft the middle of May 1977. During the dry season period S-333 discharged flow most of November, then mid-January through early February, and then March 1 through the end of the dry season (May 31).

During the wet season the stage in WCA-3A increased slowly back to a level of 10.4 ft by October 20. The last week of October the level recedes. There are two periods of discharge from S-333 during the wet season. They were: slightly more than 30 days duration from

the last of June through most of July; about 10 days in September; and about three weeks in October. The tailwater elevation was above the regulation stage from about April 1 through May 31. This apparently was the result of a period of rather high discharge from S-333 from April 1 through the third week in June.

The second year was not too different than the first year. The average stage level for the dry season was 9.98 ft, compared to 9.51 ft for the first year. The wet season average stage level for the second year was 9.28 ft. This was lower than the wet season for the first year and the year before that. The rating for the dry season would be normal, a little wetter than the previous year dry season but not wet enough to rate it wet. The wet season would have to be rated dry. Stage levels were considerably lower than the previous two years.

There were two or three minor rainfall events that may have had minor influence on operations at WCA-3A or S-333.

The total volume of discharge from WCA-3A through the S-12 structures and the S-333 was 1,003,700 acre-ft. The target distribution of 44-55 percent of flow to the West Shark Slough and Northeast Shark Slough was not met. The distribution was 81 percent and 19 percent, respectively. This is an improvement toward the target as compared to the previous two years, which were 90 percent – 10 percent and 87 percent – 13 percent, respectively. A good portion of the discharge to the Northeast Shark Slough occurred from April 1 through June 20. During this period the percentage of discharge to Northeast Shark Slough was as high as 88 percent (see figures 15, 16 and 17, pages 33, 34, 35). The percent was in excess of the 55 percent target for as much as five weeks. This period of high discharge to NESS helped to influence the total distribution. There were 15 weeks of no flow to NESS due to the G-3273 gage constraint. There were four weeks in June and July that no water was discharged from WCA-3A.

Year Four Test 7. November of Test 7 Year Four started the hydrologic year very wet in the early part of the month. The schedule for WCA 3A was at its maximum in November and December (see Figure 18, page 36). Heavy rainfall and inflows brought WCA 3A above its upper transition zone. The Corps kept the gap in L-67A and L-67C open to release water from WCA 3A into WCA 3B from November through July. The gap was closed in August, September, and October due to high stages in WCA 3B. The district closed S-343A and S-343B and increased flow through S-344 on January 26 to protect the Cape Sable Seaside Sparrow.

S-12 structures discharged at maximum level November and December and then reduced to moderate flow in accordance with the rainfall plan in January and February. In March releases through S-12 were terminated and flows increased through S-333.

During first 10 days of March operations were normal. WCA 3A was below its schedule, regulatory releases were being made from WCA 3A through S-142 into tide to protect the Cape Sable Seaside Sparrow. The S-12 releases were normal and releases were being made at S-333 (see Figure 19, page 37). However, on March 10 the Corps of Engineers and the district began to implement additional operational modifications to protect the Cape Sable Seaside Sparrow. Releases through S-12 were terminated and flows increased through S-333. S-151 and S-337 were opened to release water out of WCA 3A. After WCA 3A declined below its temporary deviation schedule releases to tide was terminated and water supply releases continued from WCA 3A through S-142.

Releases were made through S-333 according to the rainfall plan and water supply needs only. On April 14, S-339 and S-340 were opened to make water supply releases from Lake Okeechobee through WCA 3A into South Dade and the Everglades. The deviation stayed in place. One exception was rainfall on May 10, which prompted termination of releases from WCA 3A into South Dade. Closed S-339 and S-340 on June 10. The Corps made releases through S-12. The months of August, September and October were very wet.

WCA 3A was above its upper transition zone most of the time during these three months. Maximum releases were made through S-12 and regulatory releases were made into the tide through S-142.

The fourth year is similar to the third year relative to the stage level in WCA-3A. The water level on November 1 is at 10.0 ft and ranges upward to about 10.3 ft before starting a general decline about the first of February and receding through the third week in April. From that point the stage level begins to increase and increases at a fairly uniform rate through the second week in October and then a dramatic increase, apparently from heavy rainfall, reaching an elevation of 11.8 ft on 31 October.

There is some flow from S-333 during the majority of the dry season (the first week in November; December 1 through the first week of January; January 20 through the first 10 days of May; and then the last five days of May). There are three small periods of flow in the wet season. They are: first few days of June; the middle two weeks in June; and mid-July through the first week in August.

The TW stage for S-333 is near the 7.5 ft maximum level for most of the year. There are three brief periods in the dry season where the 7.5 ft level is exceeded. During the wet season the 7.5 ft level is exceeded from the last week in August through the remainder of the hydrologic year. In October there is a rather large increase apparently due to heavy rainfall.

The total volume of discharge from WCA 3A through the S-12 structures and the S-333 structure was 1,244,450 acre-ft. This is very close to the total volume discharged in the initial year of Test 7 (1,265,322 acre-ft). The target distribution of 45 percent-55 percent was not met, as was the case in all of the test years. For this year the distribution was 88 percent (1,095,750 acre-ft) for West Shark Slough and 12 percent (148,700 acre-ft) for Northeast Shark Slough. The majority of the volume of discharge (total) occurred in the wet season, particularly the last four weeks that was influenced by a large rainfall event. There were 20 weeks of no flow through S-333. Most of this occurred during the wet season. There was no flow through the S-12 structures in the period March 13 through June 12. Although the annual distribution of flow was not met the target distribution was met the weekly flows from February 27 through May 8 was 100 percent Northeast Shark Slough. It was in the first part of the dry season and the majority of the wet season where the West Shark Slough received the lion's share of the flow. See figures 20, 21 and 22, pages 38-40.

SRS Analysis of Operations

The operational objective of attaining a distribution of water to the Shark Slough consisting of approximately 55 percent into Northeast Shark Slough via S-333, and 45 percent to West Shark Slough via the four S-12 structures was not met for either of the four years in Test 7. S-333 tailwater

restrictions negate larger releases through S-333 and not operating S-333 when G-3273 is above 6.8 ft significantly reduces opportunities to discharge following rain events. Figures 9, 23 and 24 (pages 27, 41 and 42) provide stage hydrographs at the G-3273 gage for Years Two, Three, and Four of Test 7. Table 5 (page 19) displays the average monthly stage levels for S-333 headwater and tailwater is included for information. The average stage for the dry season and wet season is also provided. Average stage elevations for the tailwater do not vary greatly as would be expected. The variation in headwater is not as significant as expected. The four years are fairly consistent.

Table 5. Average Monthly Stage Levels S-333, Headwater and Tailwater

	November	December	January	February	March	April	May	Average	June	July	August	September	October	November
S-333	TW	(7.5')												
Year One	7.8	7.5	7.4	7.4	7.35	7.4	7.3	7.45	7.4	7.25	7.5	7.45	7.5	7.42
Year Two	7.3	7.45	7.1	7.05	6.95	6.95	7.05	7.12	7.18	7.3	7.25	7.3	7.3	7.27
Year Three	7.45	7.4	7.3	7.35	7.3	7.7	7.68	7.45	7.1	6.9	7.35	7.4	7.38	7.23
Year Four	7.4	7.6	7.4	7.55	7.7	7.1	6.8	7.36	7.1	7.35	7.4	7.55	8.05	7.49
S-333	HW													
Year One	11.4	10.8	10.3	9.9	9.6	9.20	9.0	10.03	9.4	9.7	9.75	9.9	10.0	9.75
Year Two	9.9	9.8	9.8	9.7	9.4	9.1	8.9	9.51	9.3	9.85	10.20	10.4	10.4	10.03
Year Three	9.97	10.45	10.4	10.48	10.40	9.75	8.4	9.98	8.35	8.87	9.3	9.7	10.2	9.28
Year Four	10.30	10.2	10.3	10.0	9.25	8.15	8.3	9.50	9.15	9.92	10.1	10.3	11.1	10.12

NOTE: Year One = 1996
 Year Two = 1997
 Year Three = 1998
 Year Four = 1999

Figure 2. S-12D Rainfall, S-333 Flow, and Operating Criteria, Year One of Test 7

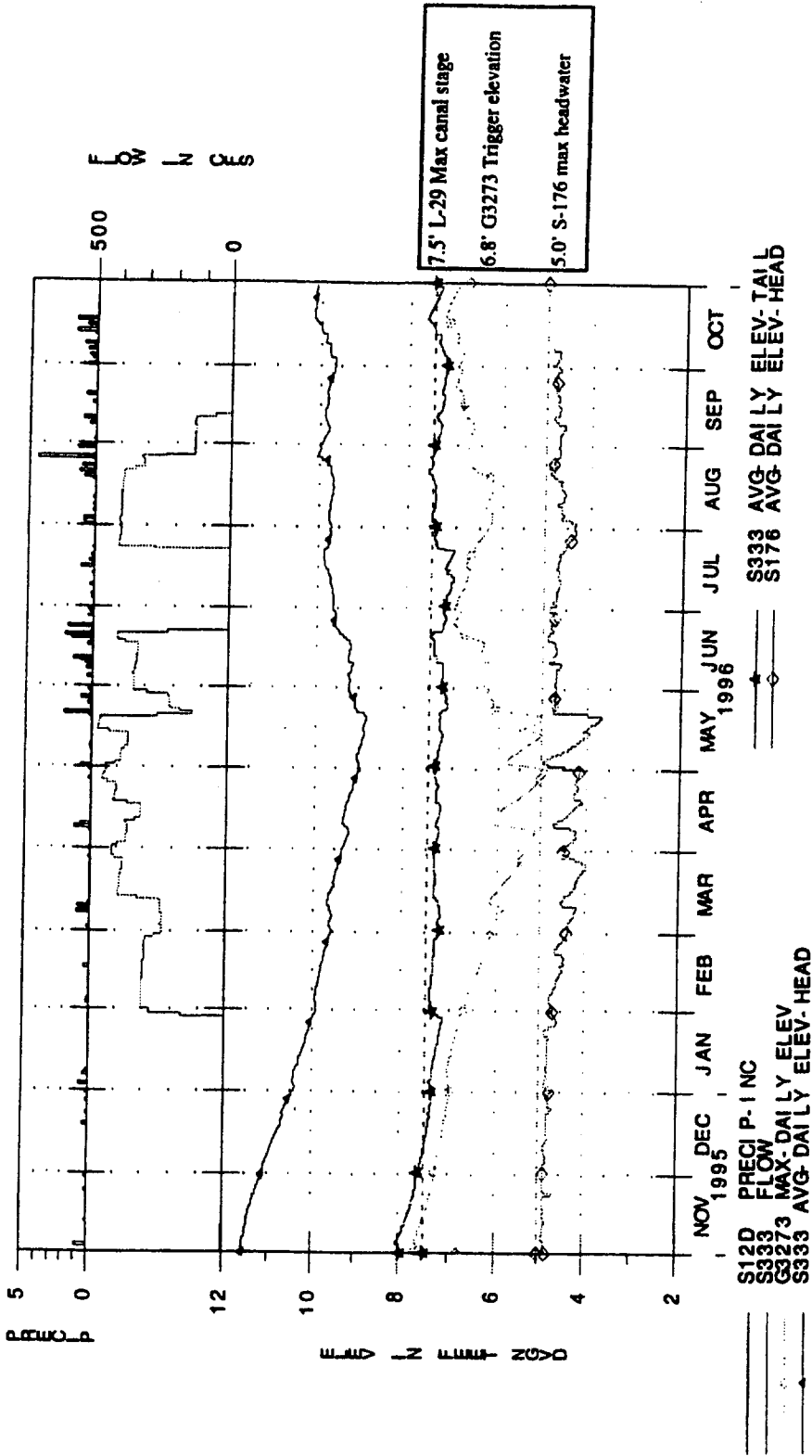


Figure 3. Shark Slough Discharge, Hydrologic Year, Period of Report

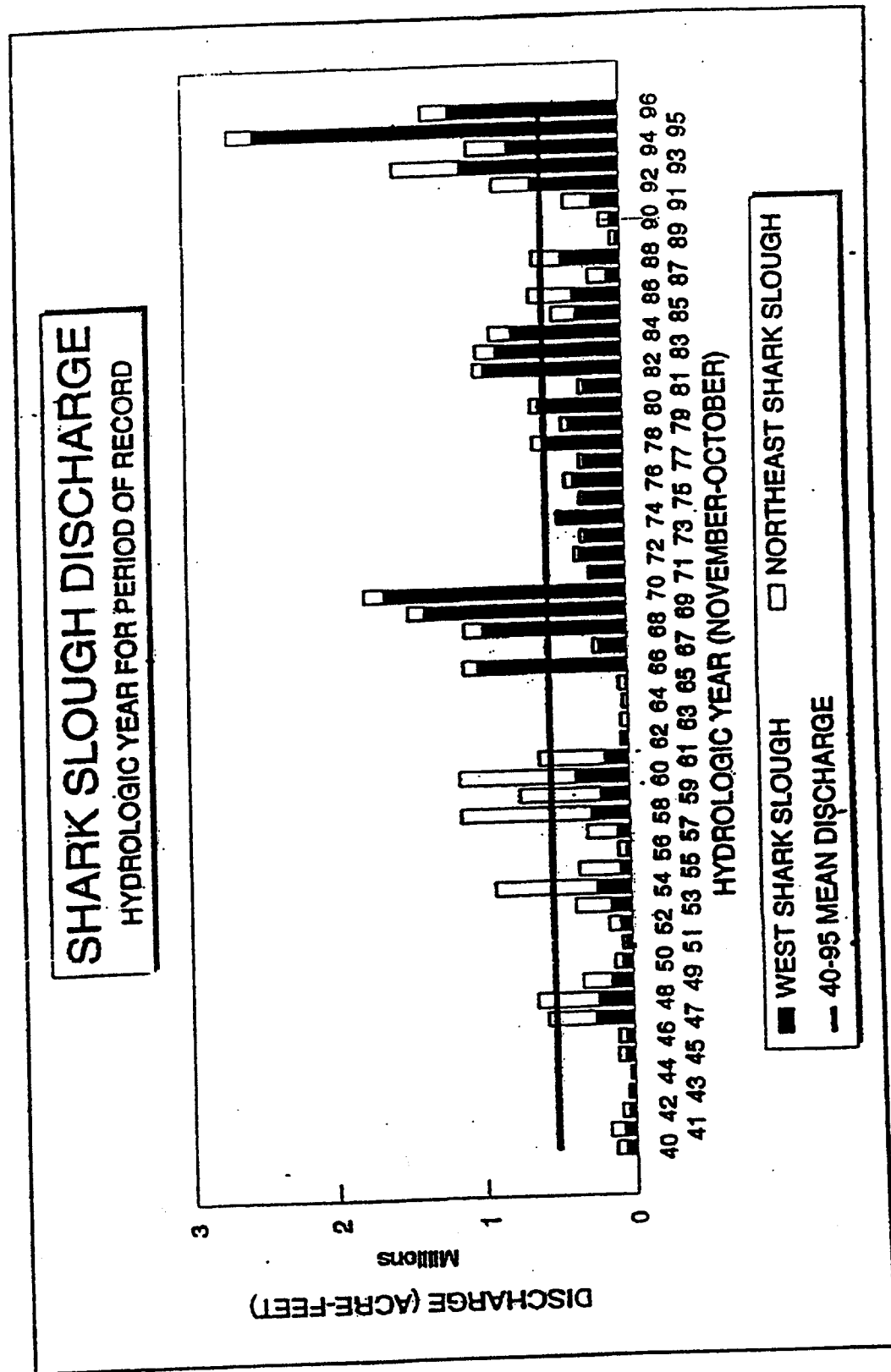


Figure 4. Discharge to Shark Slough, Year One of Test 7

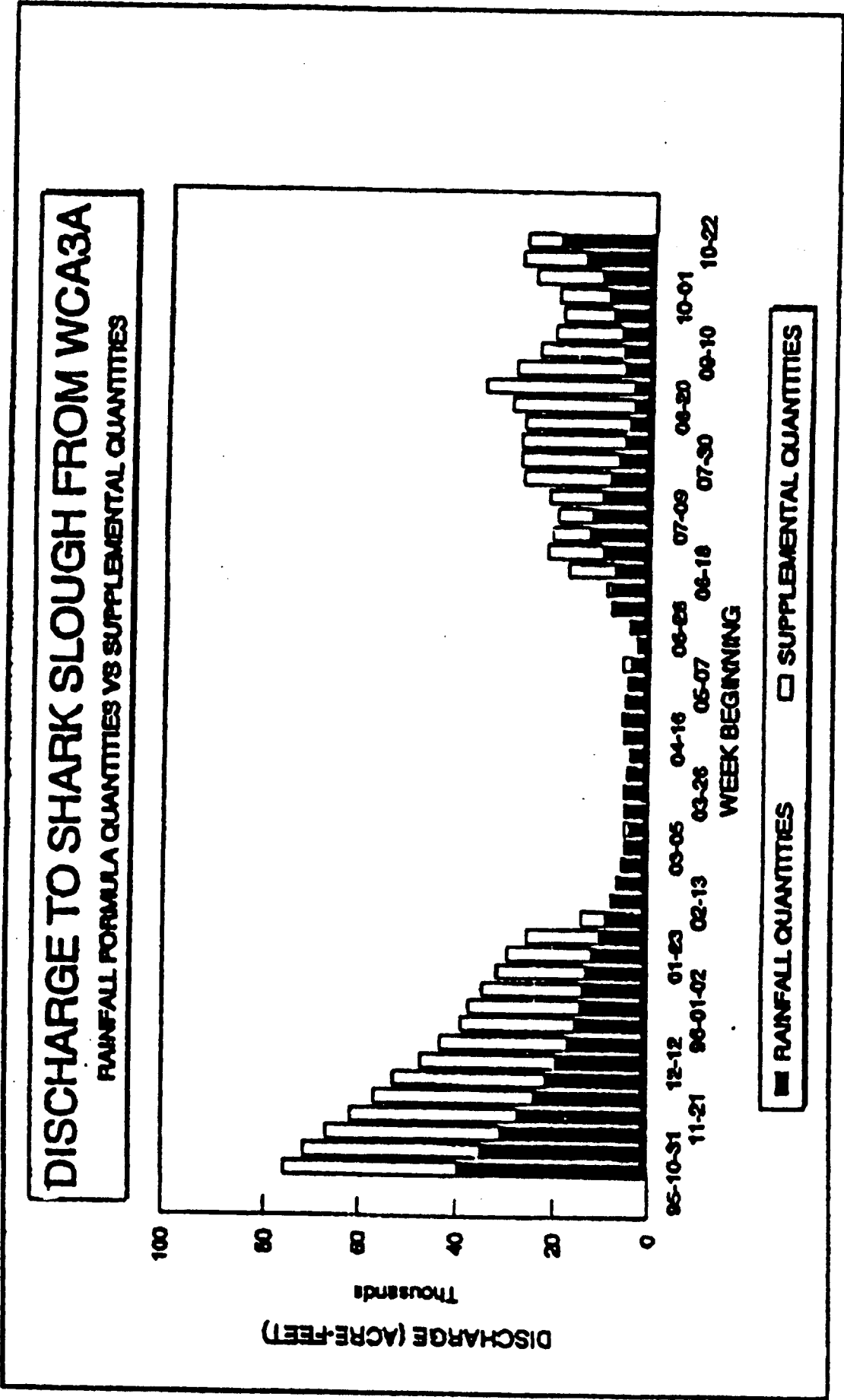


Figure 5. Discharge to West Shark Slough, Year Two of Test 7

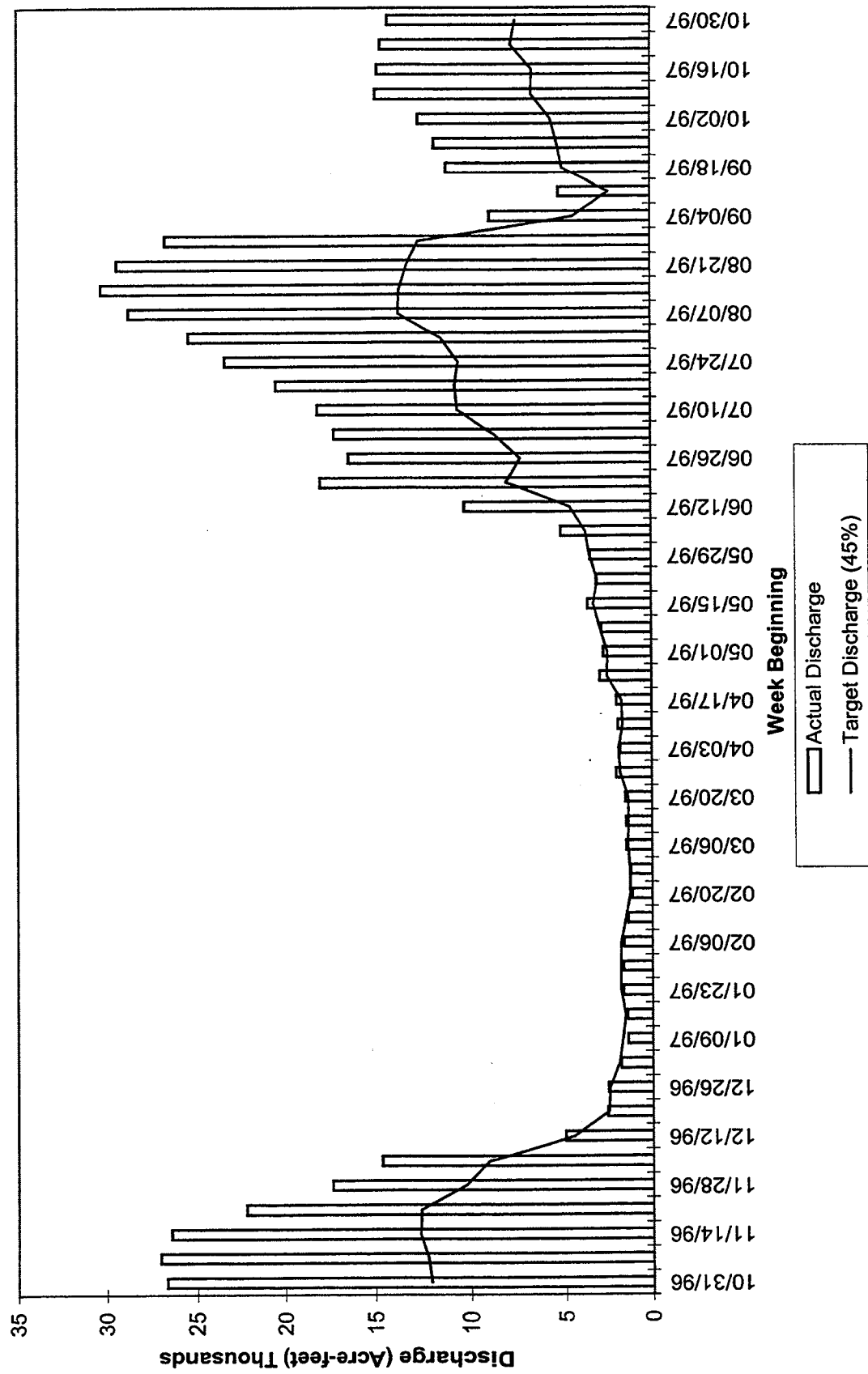


Figure 6. Discharge to Northeast Shark Slough, Year Two of Test 7

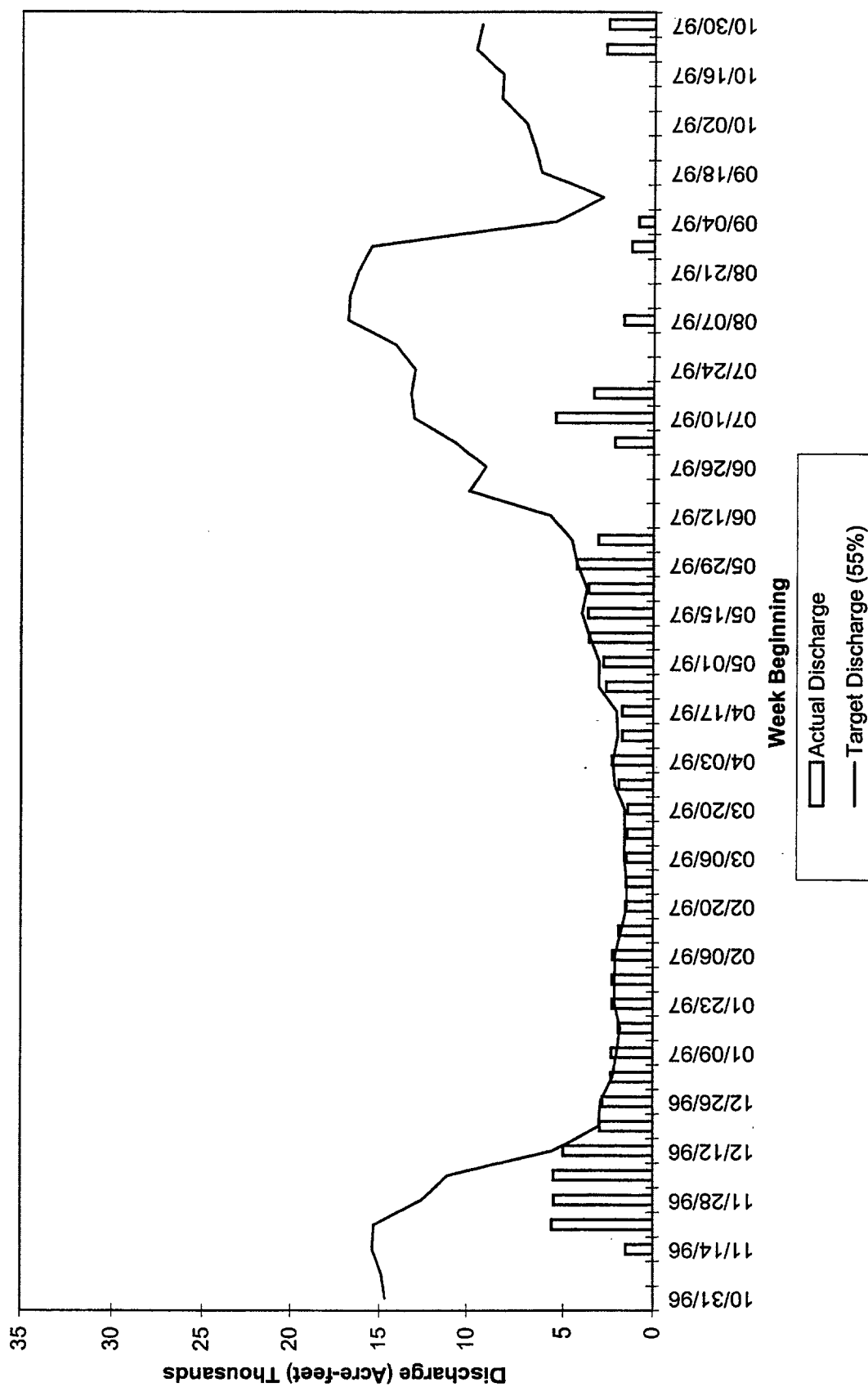


Figure 7. S-333 Headwater and Tailwater, Year Two of Test 7

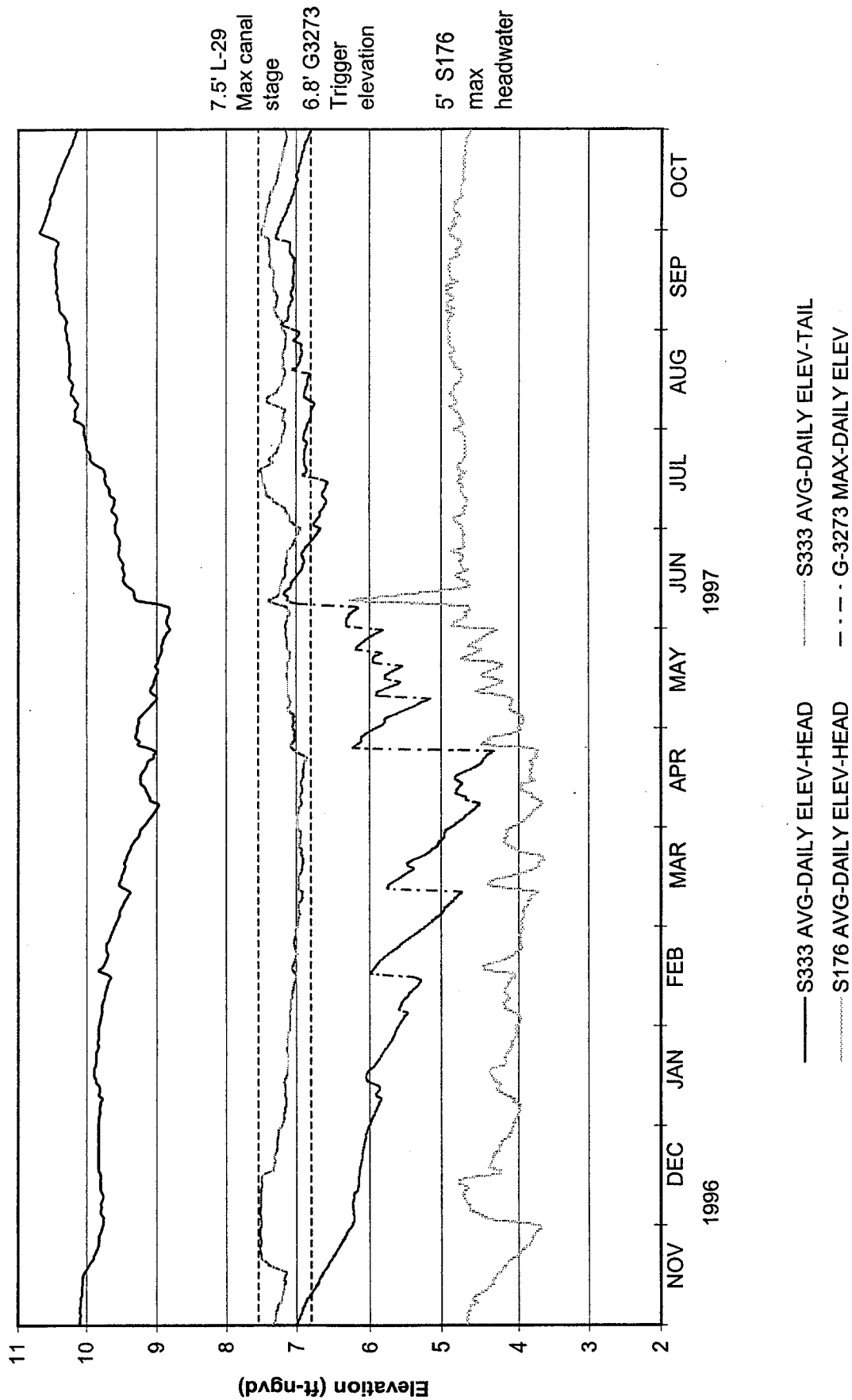


Figure 8. S-333 Flow, Year Two of Test 7

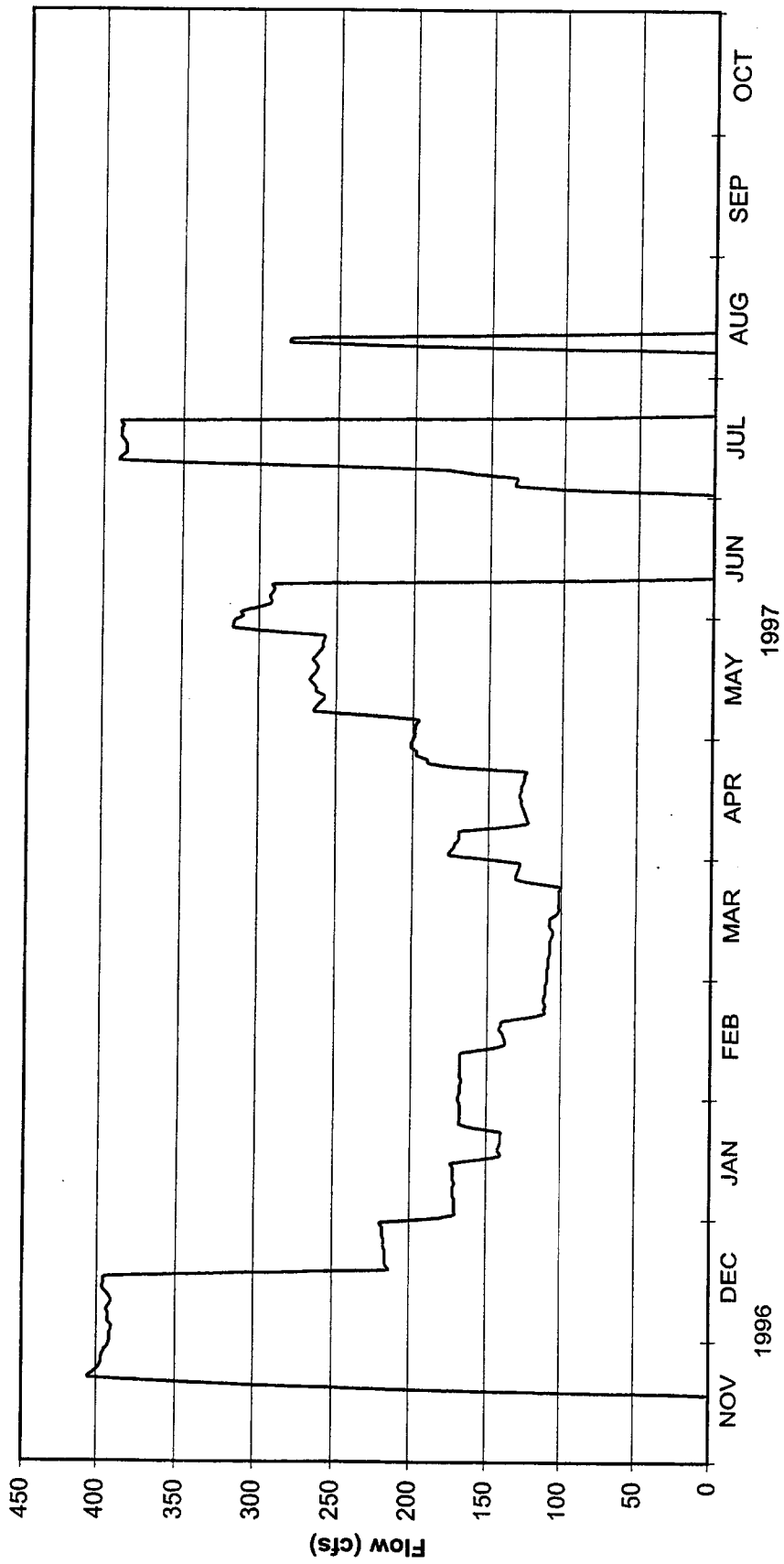


Figure 9. Stage at G-3273, Year Two of Test 7

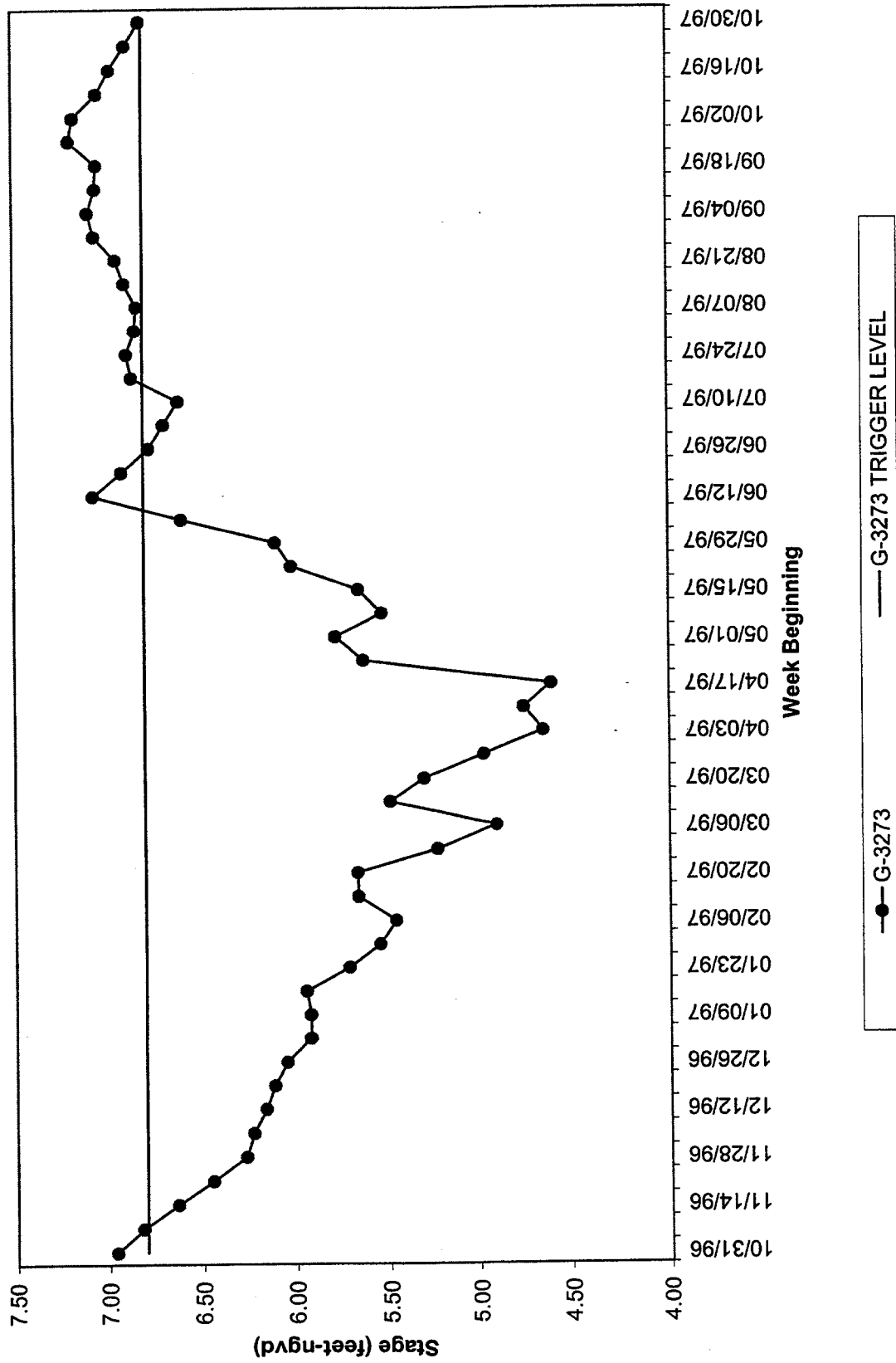


Figure 10. Discharge to Shark Slough, Year Three of Test 7

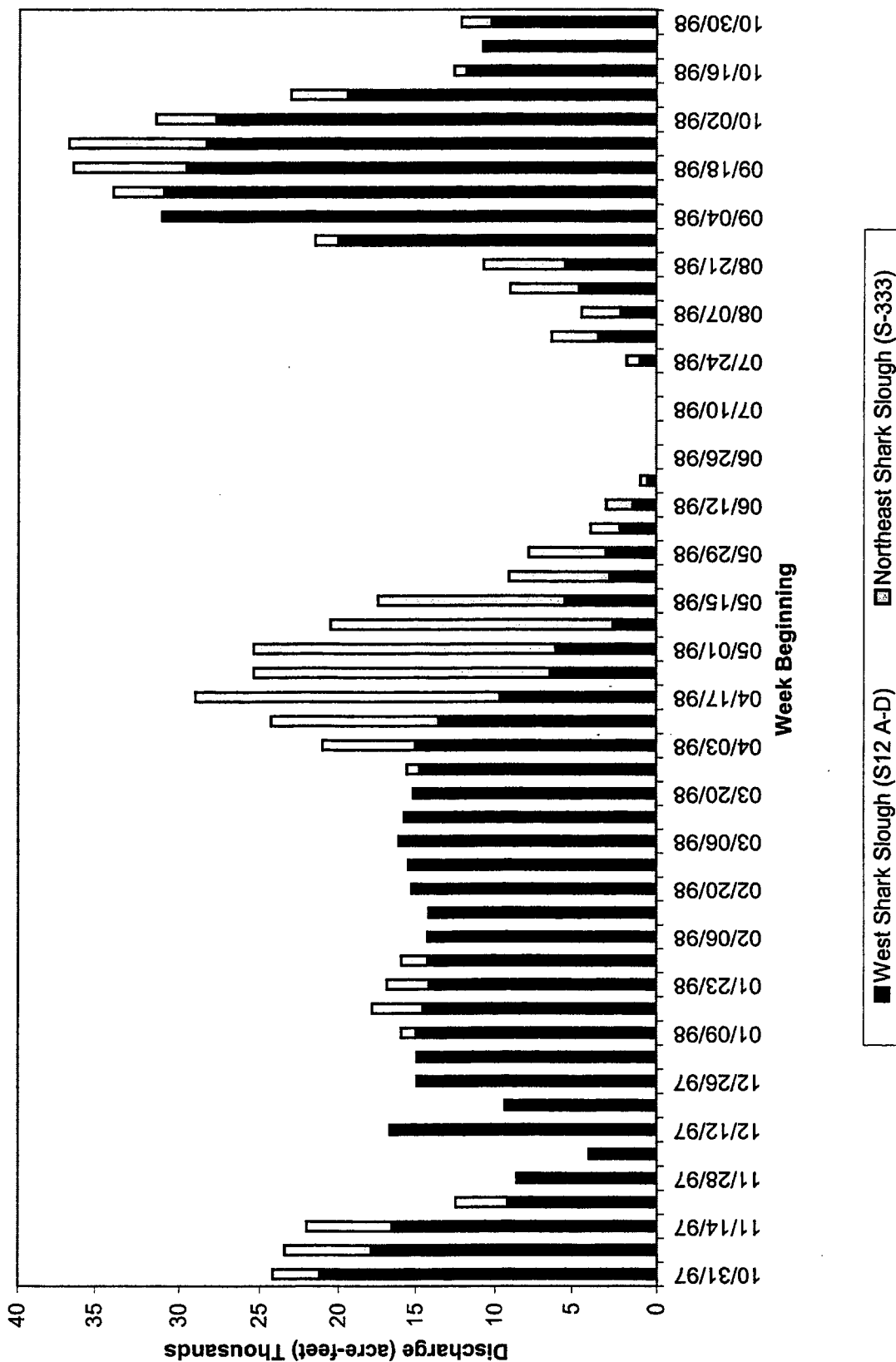


Figure 11. Discharge to West Shark Slough, Year Three of Test 7

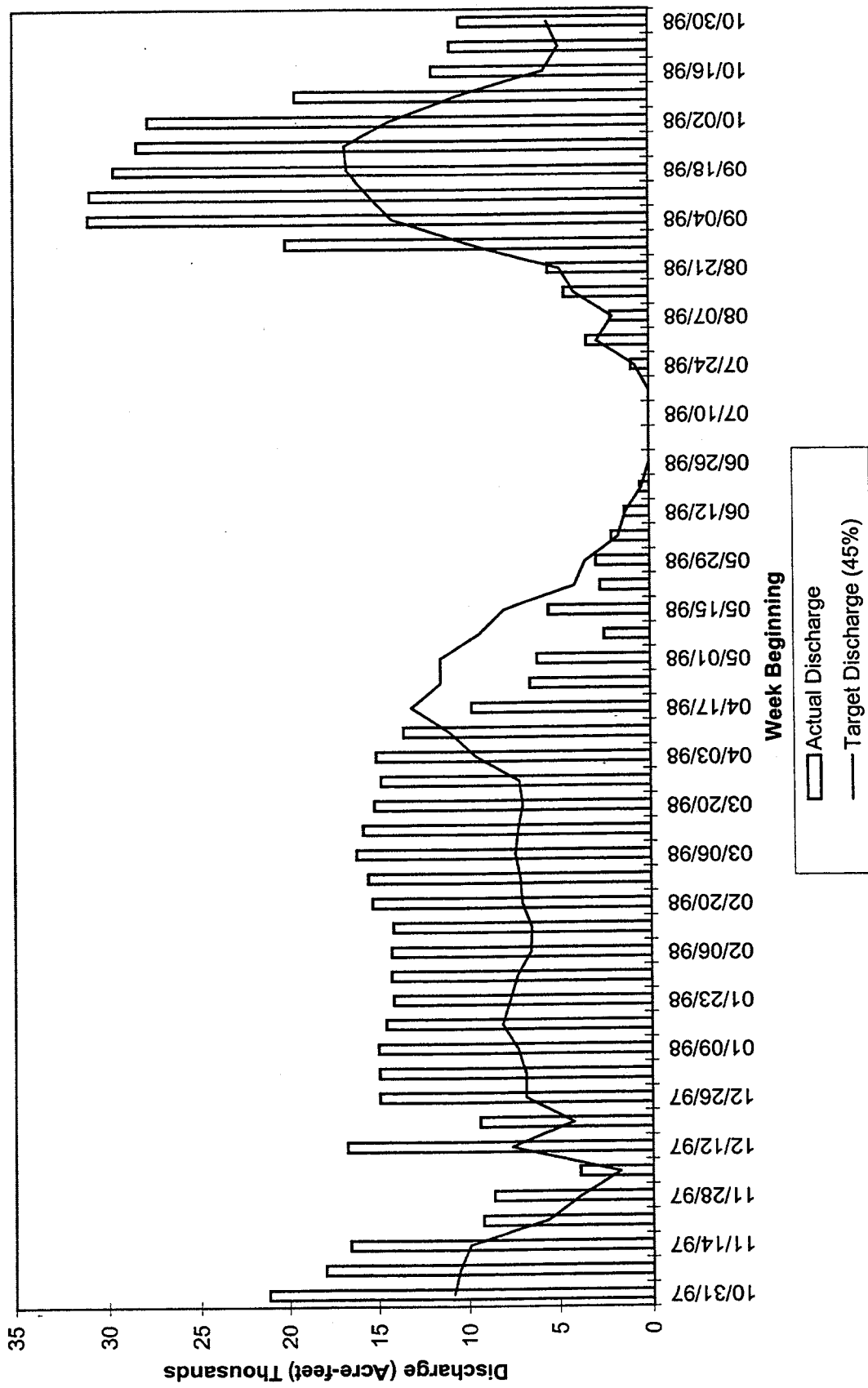


Figure 12. Discharge to Northeast Shark Sough, Year Three of Test 7

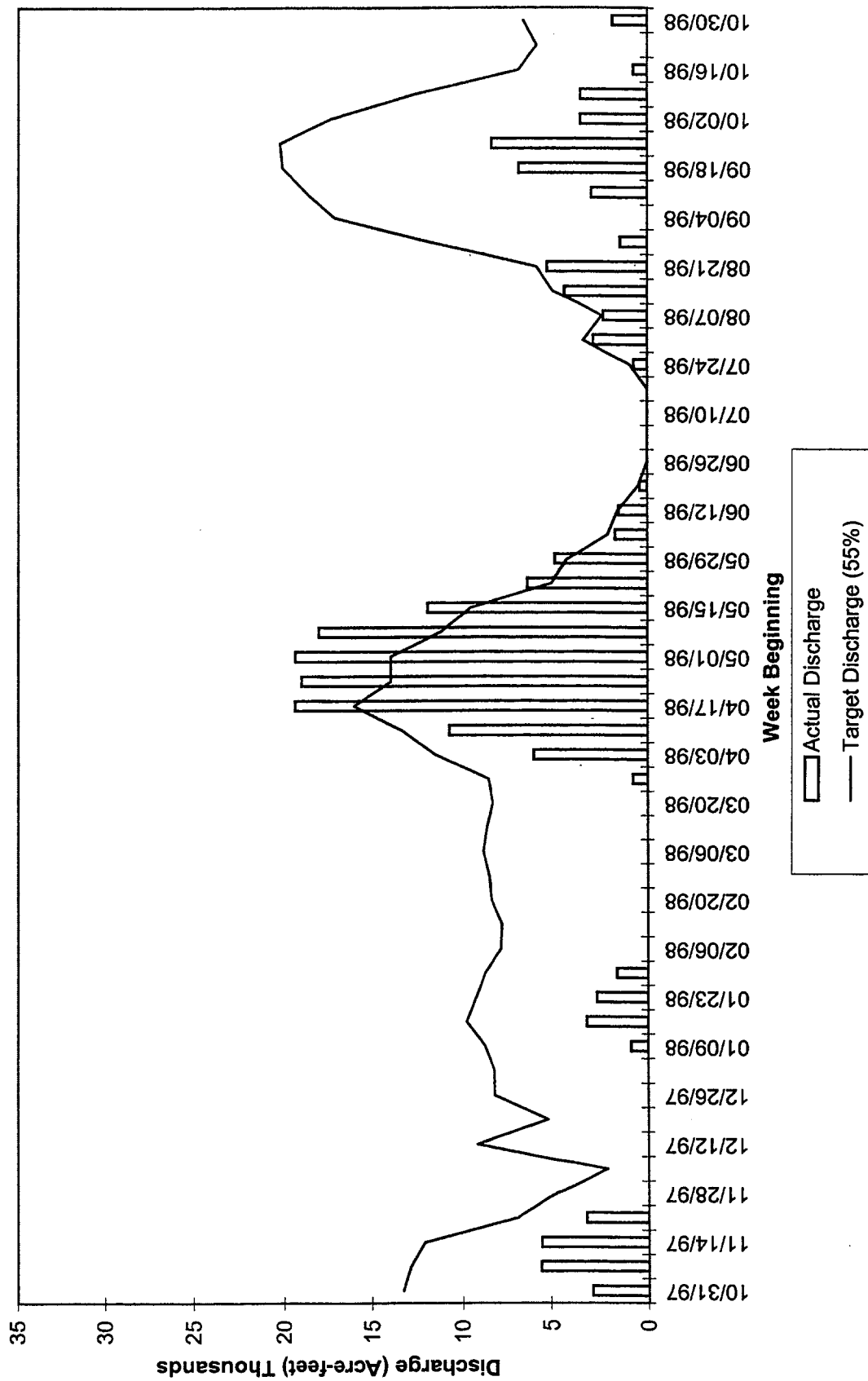


Figure 13. S-333 Headwater and Tailwater, Year Three of Test 7

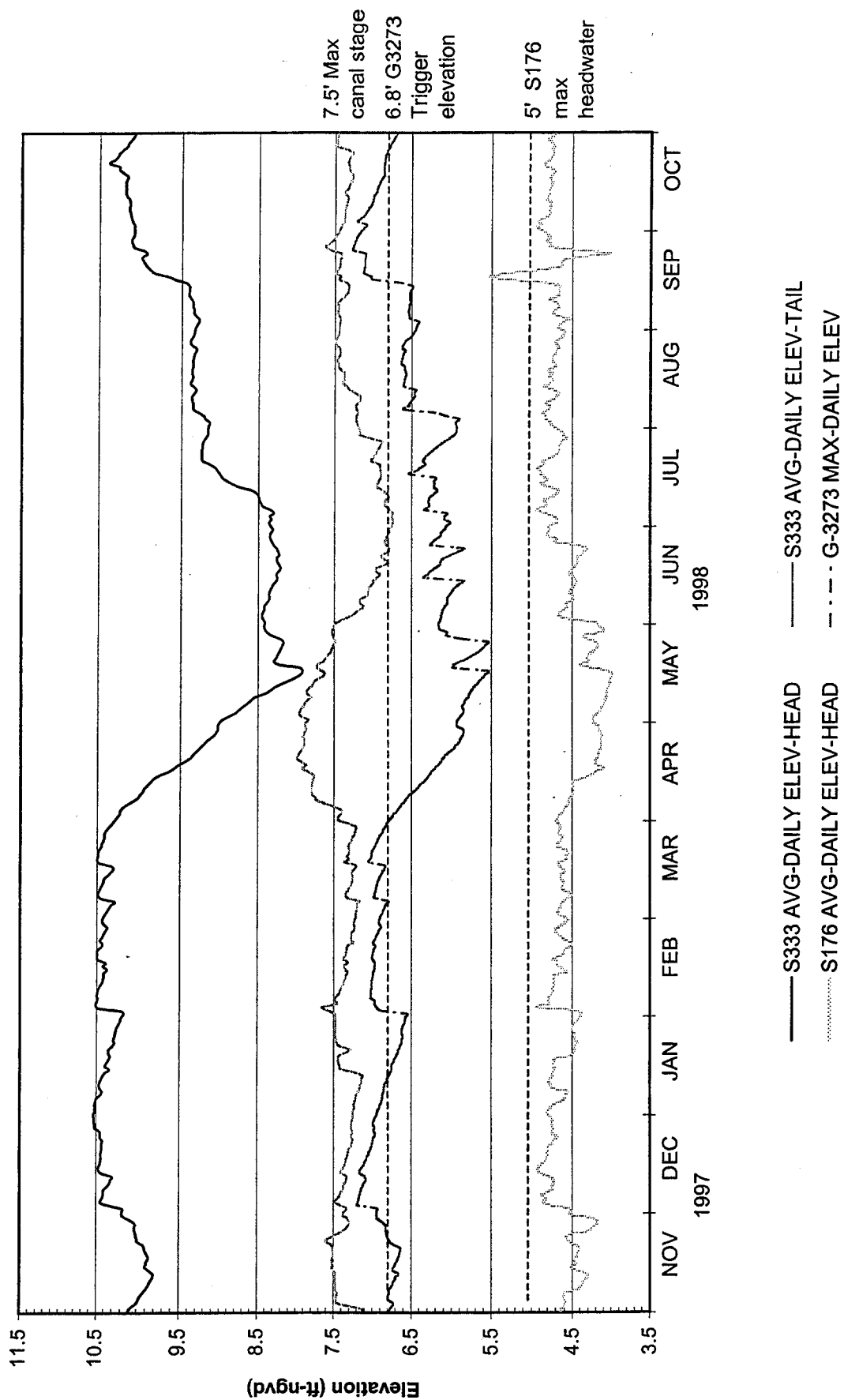


Figure 14. S-333 Flow, Year Three of Test 7

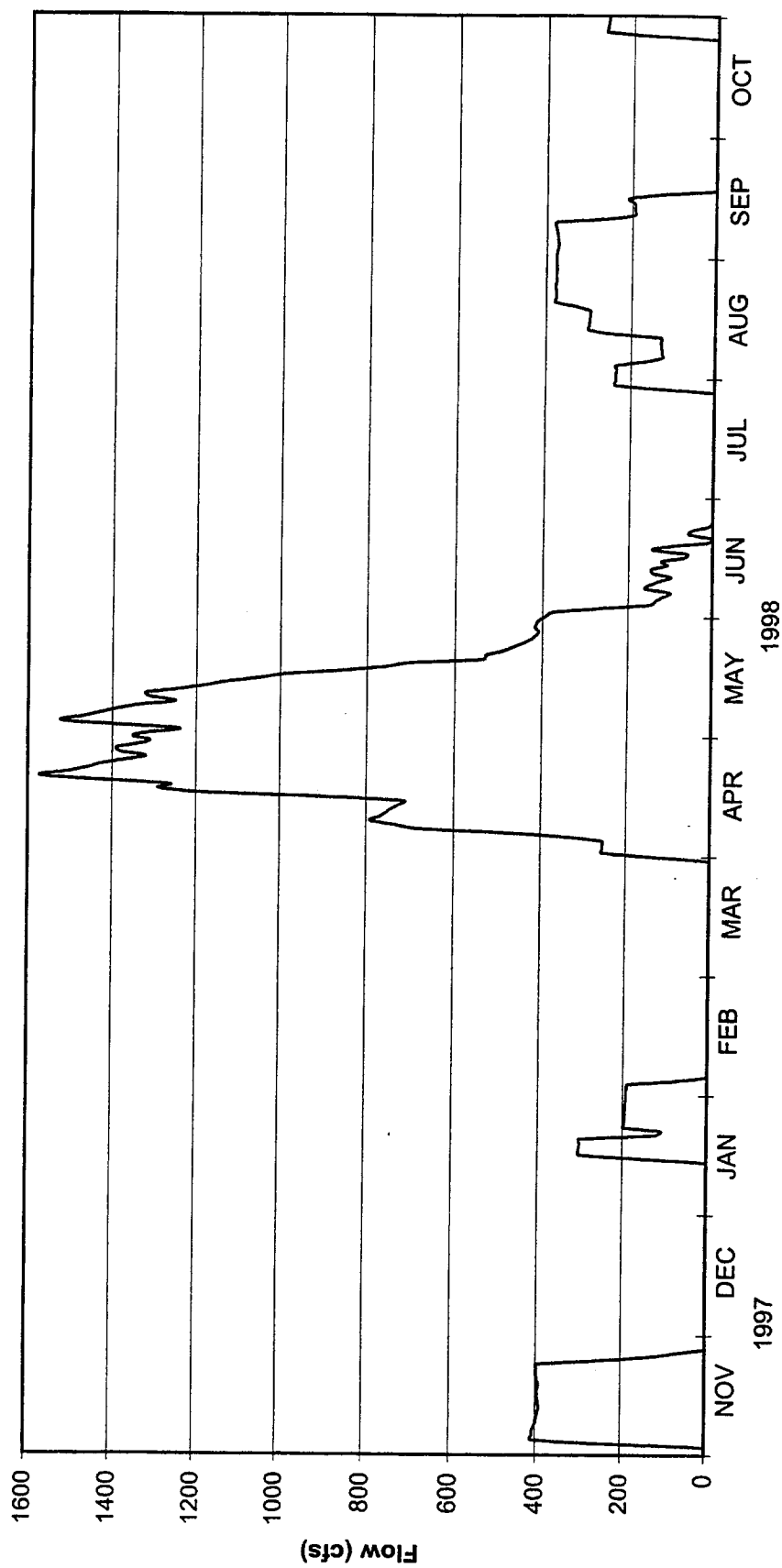


Figure 15. Discharge to Shark Slough, Year Three of Test 7

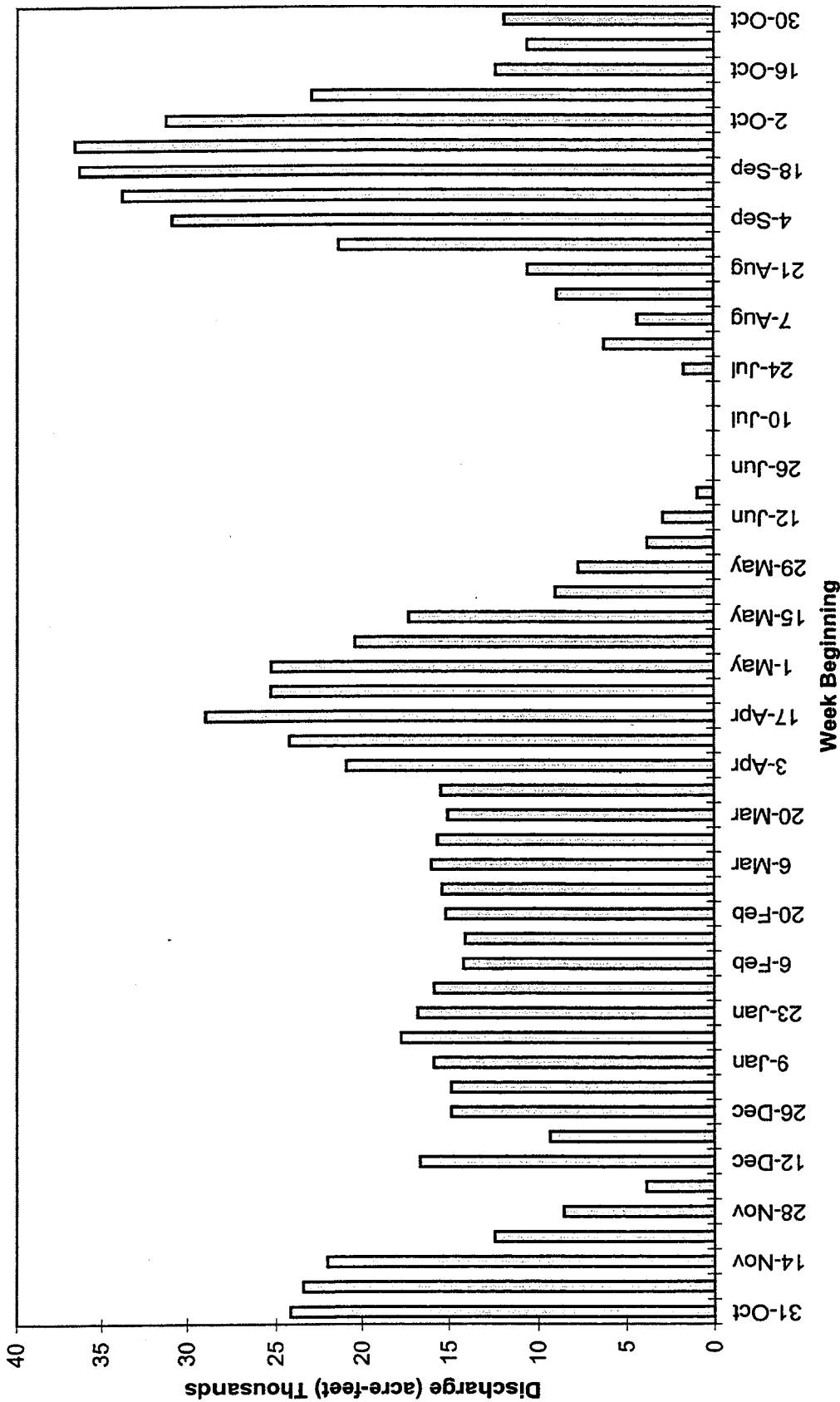


Figure 16. Discharge to West Shark Slough, Year Three of Test 7

